

CLAIMS

What is claimed is:

- 1 1. A device for sensing NO_x compounds comprising:
2 a calix[4]arene compound capable of forming a complex with at least one NO⁺ cation,
3 wherein a detectable charge-transfer reaction occurs between the NO⁺ cation and the
4 calix[4]arene.
- 1 2. The device of claim 1, wherein the detection is selected from the group
2 consisting of visualization, measurement of electrochemical changes, and measurement of
3 spectroscopic changes.
- 1 3. The device of claim 1, wherein the complex undergoes dissociation.
- 1 4. The device of claim 3, wherein the complex is decolorized.
- 1 5. The device of claim 1, wherein the calix[4]arene compound is alternatively a
2 cone calix[4]arene, a 1, 3-alternate calixarene or a combination thereof.
- 1 6. The device of claim 1, wherein the calix[4]arene compound is optionally
2 immobilized, in solution, attached to a ligand, attached to a solid support, or any combination
3 thereof.
- 1 7. The device of claim 1, wherein the NO_x compounds are optionally a gas,
2 liquid, solution, mixtures of gases, or a combination thereof.
- 1 8. The device of claim 1, wherein the complex is a storage device for the NO⁺
2 cation.
- 1 9. The device of claim 1, wherein the complex is capable of transferring the NO⁺
2 cation to a substrate.
- 1 10. The device of claim 1, wherein the complex is stabilized by one or more
2 Lewis acids.

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- 1 11. A device for purifying chemical compounds containing NO_x comprising:
2 a calix[4]arene compound, wherein the calix[4]arene compound complexes a NO⁺
3 cation from the chemical compound and is capable of transferring the NO⁺ cation produced
4 from the NO_x.
- 1 12. The device of claim 11, wherein the calix[4]arene compound is optionally
2 immobilized, in solution, attached to a ligand, on a solid interface, attached to a solid support,
3 or a combination thereof.
- 1 13. The device of claim 11, wherein the complex is a storage device for the NO⁺
2 cation.
- 1 14. The device of claim 13, wherein the complex is chemically stable for at least
2 several weeks.
- 1 15. A method of purifying chemical compounds comprising:
2 exposing a calix[4]arene compound to a mixture of chemical species;
3 allowing the calix[4]arene compound to interact with the mixture, wherein the
4 calix[4]arene compound forms an NO⁺ complex.
- 1 16. A molecular container comprising:
2 a calix[4]arene compound; and
3 at least one NO⁺ cation.
- 1 17. The molecular container of claim 16, wherein the calix[4]arene compound
2 complexes the NO⁺ cation and is capable of storing it.
- 1 18. The molecular container of claim 16, wherein the calix[4]arene compound
2 complexes the NO⁺ cation and is capable of transferring it to another substrate
- 1 19. An optical switch comprising:
2 a calix[4]arene-nitrosonium complex in which the nitrosonium is capable of changing
3 between a free and complexed state wherein the switching can be detected optically.

- 1 20. An optical switch comprising:
- 2 a means for complexing a nitrosonium cation; and
- 3 a means for detecting the presence of the complex.